CLAIMS

1. A plasma processing apparatus comprising:

an RF generator operable to output RF power;

an impedance matching network operable to receive the RF power;

a plasma chamber operable to receive an output from the impedance matching network;

a storing unit operable to store information relating to an S parameter of the impedance matching network; and

a control unit operable to control an operating condition for the plasma chamber, based on the information relating to the S parameter.

2. The plasma processing apparatus of Claim 1, wherein

the information relating to the S parameter of the impedance matching network is at least one of the S parameter of the impedance matching network and a power transmission efficiency of the impedance matching network which is calculated based on the S parameter.

3. The plasma processing apparatus of Claim 1, wherein

the impedance matching network is an automatic impedance

matching network which, when impedance mismatch occurs between the impedance matching network and the plasma chamber, detects the impedance mismatch, and adjusts a variable capacitor included in the impedance matching network, to achieve impedance match between the impedance matching network and the plasma chamber.

4. The plasma processing apparatus of Claim 1, wherein

the S parameter of the impedance matching network is measured using an RF network analyzer.

5. A control method for a plasma processing apparatus in which RF power is supplied by an RF generator to a plasma chamber through an impedance matching network so that plasma processing is performed in the plasma chamber, wherein

a power transmission efficiency from the RF generator to the plasma chamber is calculated based on an S parameter of the impedance matching network, and

a control unit of the plasma processing apparatus controls the plasma chamber in reference to the power transmission efficiency.

6. The control method of Claim 5, wherein

the S parameter of the impedance matching network is S21 which is a forward transmission parameter.

7. The control method of one of Claims 5 and 6, wherein

the RF power supplied by the RF generator is controlled in reference to the power transmission efficiency.

8. An evaluation method for a plasma processing apparatus in which RF power is supplied by an RF generator to a plasma chamber through an impedance matching network so that plasma processing is performed in the plasma chamber, wherein

an RF network analyzer is used to measure an S parameter of the impedance matching network, and

a power transmission efficiency from the RF generator to the plasma chamber is calculated based on the measured S parameter.

9. The evaluation method of Claim 8, wherein

the S parameter of the impedance matching network is S21 which is a forward transmission parameter.

10. The evaluation method of one of Claims 8 and 9, wherein

an amount of power the plasma chamber receives is obtained based on the power transmission efficiency.

11. The evaluation method of one of Claims 8 and 9, wherein

when η, RL and Rm respectively denote the power transmission efficiency, a real resistance in the plasma chamber, and a real resistance in the impedance matching network, $Rm=(RL/\eta)-RL$.

12. An evaluation method for a plasma processing apparatus in which RF power is supplied by an RF generator to a plasma chamber through an impedance matching network so that plasma processing is performed in the plasma chamber, wherein

an RF network analyzer is used to measure an S parameter of the impedance matching network, and

a matching impedance is obtained using a matching network function of the RF network analyzer.

13. An evaluation method for an impedance matching network, wherein

an S parameter of an impedance matching network is measured,

and converted into a power transmission efficiency η of the impedance matching network, and

when RL and Rm respectively denote a real resistance in a load and a real resistance in the impedance matching network, $Rm=(RL/\eta)-RL$.